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ELECTRIC SPEEDBRAKE™ 2000 INSTALLATION MANUAL FOR THE RAYTHEON (BEECHCRAFT) MODELS 33, 35, AND A36

Bonanza Model 33

Bonanza Model 35

Bonanza Model A36

NOTICE

The Airworthiness Limitations section (Section 4.0) is FAA Approved and Specifies maintenance required under Sections 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA Approved.

These Documents must be Kept with the Aircraft Records

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TABLE OF CONTENTS

Table of Contents 2
Revisions 4
List of Active Pages 5
1.0 Overview 6
1.1 Installation Overview 6
1.2 How to Use This Manual and Read the Drawings 7
1.2.1 Notes And Warnings 7
1.2.2 Drawing Interpretation 7
1.2.2.1 Parts Lists 8
1.3 Important Installation Notes 9
1.4 List of Tools Required 9
1.5 List of Supplies Required 10
1.6 List of Abbreviations 10
1.7 Manual and ICA Revisions 10
2.0 Installation Instructions 11
2.1 Interior Removal 12
2.2 Installation of the Asymmetric Logic Controller (ALC) 13
2.3 Electrical Installation 14
2.4 Locating Wing Cutouts 15
2.4.1 Model 33 and 36 (Straight Tail) Installation Instructions 16
2.4.2 Model 35 (V-Tail) Installation Instructions 18
2.5 Rivet Removal and Wing cutouts 20
2.5.1 Model 33 & 36 (Straight tail) Rivet Removal and Wing Cutouts 20
2.5.2 Model 35 (V-tail) Rivet Removal and Wing Cutouts 22
2.6 Doubler Preparation 24
2.6.1 Model 33 & 36 (Straight tail) Doubler Preparation 24
2.6.2 Model 35 (V-tail) Doubler Preparation 26
2.7 Doubler Installation 28
2.7.1 Model 33 & 36 (Straight tail) Doubler Installation 28
2.7.2 Model 35 (V-Tail) Doubler Installation 30
2.8 Preliminary SpeedBrake Installation 32
2.8.1 Model 33 & 36 (Straight tail) Preliminary SpeedBrake Installation 32
2.8.2 Model 35 (V-tail) Preliminary SpeedBrake Installation 34
2.9 Final Cartridge Installation 36
2.9.1 Model 33 & 36 (Straight tail) Cartridge Installation 36
2.9.2 Model 35 (V- tail) Cartridge Installation 37
2.10 Circuit Breaker and Switch Installation 38
2.11 Placards Installation 39
2.12 Interior Installation 40
2.13 System Installation Functional Check Out 41
2.14 Documentation 42

3.0 Trouble Shooting Guide 43
3.1 SpeedBrake Cartridge Fails to Operate Correctly 43
3.2 Warnings 43
3.3 Additional Technical Assistance 43
4.0 Instructions for Continued Airworthiness 44
4.1 Introduction 44
4.2 System Description 44
4.3 Special Tools Required 45
4.4 Maintenance Instructions 45
4.5 Trouble Shooting Guide 45
4.6 Airworthiness Limitations 45
4.7 Scheduled Maintenance Intervals and Inspections for Continued Airworthiness 45
5.0 Appendices 47

REVISIONS

Rev.	DESCRIPTION OF CHANGES	Author	Date	Approved By	Approved Date
-	Original Release	-	-	-	-
A	Updated format of document, added aids to reading drawings, added Section 4 - Instructions for Continued Airworthiness (ICA) and note on cover sheet, clarified warnings, cautions, and notes to the installer, added section 1.7 for revisions, added guides and warnings to prevent incorrect installations of the wrong kit on the wrong aircraft model and configuration. Clarified instructions to distinctly note the differences between models, or voltage options in the instructions. Added system checkout and interior re-installation steps.	Scott Philiben / James N. Sutherland	11/14/2003	James N. Sutherland	11/14/2003
B	Page 26: fixed typo: 04731 was 05308 Page 28: fixed typo: rivet 0.094 was ?.094 Page 30: fixed typo: rivet 0.094 was ?.094 Page 33: fixed typo: 121S0111-1 was 121S0010-2	M. Kosko	02/04/2009	Wieland Ashforth	4/3/09

STC NO. SA01075SE - SPEEDBRAKE™ 2000 ELECTRICAL INSTALLATION MANUAL

LIST OF ACTIVE PAGES

ORIGINAL		ADDED PAGES					
PAGE	REV	PAGE	REV	PAGE	REV	PAGE	REV
1	-	1	A				
2	-	2	A				
3	-	3	A				
4	-	4	A				
5	-	5	A				
6	-	6	A				
7	-	7	A				
8	-	8	A				
9	-	9	A				
10	-	10	A				
11	-	11	A				
12	-	12	A				
13	-	13	A				
14	-	14	A				
15	-	15	A				
16	-	16	A				
17	-	17	A				
18	-	18	A				
19	-	19	A				
20	-	20	A				
21	-	21	A				
22	-	22	A				
23	-	23	A				
24	-	24	A				
		25	A				
		26	B				
		27	A				
		28	B				
		29	A				
		30	B				
		31	A				
		32	A				
		33	B				
		34	A				
		35	A				
		36	A				
		37	A				
		38	A				
		39	A				
		40	A				
		41	A				
		42	A				
		43	A				
		44	A				
		45	A				
		46	A				
		47	A				

ORIGINAL		ADDED PAGES					
PAGE	REV	PAGE	REV	PAGE	REV	PAGE	REV

1.0 OVERVIEW

1.1 INSTALLATION OVERVIEW

1. Read through the entire manual, and become familiar with the drawings, before beginning any part of the installation process.
2. The installation of Precise Flight, Inc. SpeedBrakes™ consists of cutting openings in the top and bottom of each wing skin and using locating templates (Drawings).
3. Installing doublers to reinforce the cutout areas, which will require removing existing rivets and installing new rivets.
4. No painting is necessary, except for the touching up of reinstalled and new rivet heads.
5. Installing the asymmetric logic control unit (ALC) and wiring the SpeedBrakes™ will require removing the interior, running wires through the fuselage from the ALC unit to the switch location, installing wiring from the ALC to the individual SpeedBrake™ Cartridges in the wing, and installing a breaker to protect the system with a switch to actuate the ALC and SpeedBrake™ Cartridges.
6. Functionally checking SpeedBrake™ operation.
7. Filling out necessary FAA paperwork and logbook entries to return the aircraft to service.
8. Completing and mailing the warranty card to Precise Flight, Inc.

1.2 How to Use This Manual and Read the Drawings

1.2.1 Notes And Warnings

Because of the uniqueness of this installation in existing aircraft, Precise Flight has added notes, cautions, and warnings to the installation manual.

NOTE

Notes are used to emphasize certain steps to prevent problems with the installation. We, at Precise Flight, have added these notes to prevent problems before they occur based on our experience installing these systems, or from 'your' feedback.

! **CAUTION** !

Cautions are used if aircraft damage can occur due to a missed step. Please remember, we only have these in key locations based on previous experience. It is the installer's responsibility to make sure the installation is done correctly, and to airworthiness standards.

!! WARNING !!

Warnings are used to emphasize a part of the installation where if done incorrectly can pose a serious hazard to the installer or the pilot.

1.2.2 Drawing Interpretation

All drawing produced by Precise Flight Inc, are based on ASME Y14.5-1994 standards, measurements in Inches, and Third Angle Projection. Information on the drawings including notes, parts, etc. are part of the FAA approved design and in most cases do include important installation and manufacturing information.

Third Angle Projection is the method drawing views are produced as shown in Figure 1.

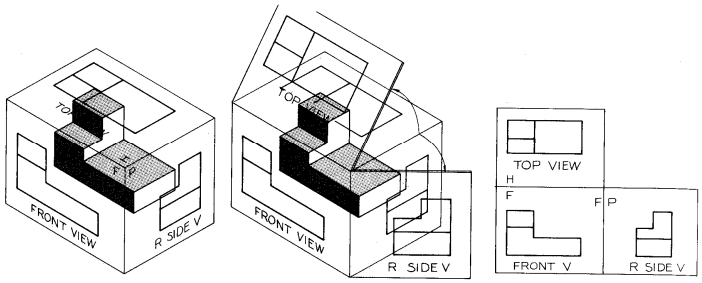

Figure 1 - Third Angle Projection Example (Earle, James. "Engineering Design Graphisc")

1.2.2.1 Parts Lists

A source of possible confusion when reading drawings is the proper interpretation of the parts list. This STC includes multiple aircraft models, and voltages, in the same drawing package. Because of the difference between the Bonanza Model 33 and 36 to the Model 35 aircraft installations, special care must be taken to make sure the correct installation is used.

Figure 2 below shows a 12V Model 35 speed brake installation, and which drawings are applicable. For clarification, the applicable connections are shown shaded.

1	-	-	-	-	-	121S0103-5	CARTRIDGE INSTALL #33/36 R 12V	-----	17
1	-	-	-	-	-	121S0103-3	CARTRIDGE INSTALL #33/36 L 12V	-----	16
-	-	1	-	1	-	121S0103-2	CARTRIDGE INSTALL #33/36 R 24V	-----	15
-	-	1	-	1	-	121S0103-1	CARTRIDGE INSTALL #33/36 L 24V	-----	14
1	**1**	**1**	**1**	**1**	**-**	**121S0014-1**	**ALC INTERCONNECT INSTALLATION**	**-----**	**13**
1	**1**	**1**	**1**	**1**	**-**	**121S0004-1**	**SYSTEM SCHEMATIC**	**-----**	**12**
-	**1**	**-**	**-**	**-**	**-**	**121S0003-4**	**CARTRIDGE INSTALL, 35, RT 12V**	**-----**	**11**
-	**1**	**-**	**-**	**-**	**-**	**121S0003-3**	**CARTRIDGE INSTALL, 35, LEFT 12V**	**-----**	**10**
-	-	-	1	-	-	121S0003-2	CARTRIDGE INSTALL, 35, RT 24V	-----	9
-	-	-	1	-	-	121S0003-1	CARTRIDGE INSTALL, 35, LEFT 24V	-----	8
1	**1**	**-**	**-**	**-**	**-**	**121S0002-2**	**COCKPIT CONTROL INSTALL, 12V**	**-----**	**7**
-	-	1	1	1	-	121S0002-1	COCKPIT CONTROL INSTALL, 24V	-----	6
\	-	-	-	-	4006-12	121S0001-5	SPEEDBRAKE INST – MODEL 33, 12V	-----	5
-	\	**-**	**-**	**-**	**4002-12**	**121S0001-4**	**SPEEDBRAKE INST – MODEL 35, 12V**	**-----**	**4**
-	-	\	-	-	4006-24	121S0001-3	SPEEDBRAKE INST – MODEL 33, 24V	-----	3
-	-	-	\	-	4002-24	121S0001-2	SPEEDBRAKE INST – MODEL 35, 24V	-----	2
-	-	-	-	\	4005-24	121S0001-1	SPEEDBRAKE INST – MODEL 36	-----	1
-5	**-4**	-3	-2	-1	CODE	PART NO.	DESCRIPTION	MATERIAL/MFG.	ITEM
QTY REQD									

Figure 2 - Sample Parts List from Drawing 121S0001 Rev A

This chart shows us the kit number is a 4002-12, for part number 121S0001-4. Because all 35 models listed on the STC are applicable, this installation would be used for any V-tail Bonanza model A35, B35, C35, D35, E35, F35, G35, 35R, H35, J35, K35, N35, P35, S35, V35, V35A, V35B with a 12-14V electrical system as described in section 2.0 of this document, or on the STC certificate. From here, the installer moves to the left until a "\" marks that applicable installation. Follow the column up to see what quantity is greater than 0. Then follow the chart back to the right to find the drawing/part number for the applicable installation. Drawings are shown in this example, but parts work on the same principle on the other installation drawings.

1.3 IMPORTANT INSTALLATION NOTES

This section lists specific installation notes of importance for this STC installation.

NOTE
It is the installer's responsibility to verify that the installation of the SpeedBrake™ 2000 system will not interfere with any excising modification on the aircraft prior to starting the installation. Contact Precise Flight if there appears to be an installation conflict.

! **CAUTION** !
If installation is on a Beechcraft Model G35, H35, J35, K35, or M35 with factory installed AUX tanks, verify that there is not a fuel tank in the location where the SpeedBrake will be located **prior to drilling or cutting** into the wing during installation.

! **CAUTION** !
Verify aircraft voltage and SpeedBrake kit voltage prior to installation. Failure to use correct installation kit may damage aircraft systems, or SpeedBrake installation.

1.4 LIST OF TOOLS REQUIRED

Each section will include a list of tools required and all necessary parts for that section.

Table 1 - Tools Required

Automatic Center Punch
Bucking Bars
Chip Chaser
Clecos: 3/32, 1/8, 5/32, and Side Grip Clamps
Cleco Pliers
C Squeeze: Counter Sink Die #40, Flush Die Set
Copy of AC 43.13-1A Chapter 11
Die Grinder with Abrasive Cutter Wheel and Carbide Burr
Drills: #40, #30, #27, #18, #12, 1/4, 7/16, and 5/8 Capacity Unibit
Drill Motor - Standard
Drill Botor - 90 degree
Files: 1/4 inch Round and 6 Inch Flat
Heat Gun
Hole-Finder
Micros Adjust Countersink: 100 Degree #40 Pilot
Needle Nose Pliers
Rivet Gun: with Flush Set, 470-3 and 470-4 Rivet Set
Rivet Puller
Ruler: 12 inch (minimum)
Screwdriver: Slot and Phillips #1 and #2 Tip
Screwdriver 18" #2 Phillips
Screwdriver 90 Degree #2 Phillips
Snips: ProSnip Offset Snips 20SR, 20SL or Equivalent
Socket set ¼" drive
Soldering iron
Tape measure: 12 feet minimum
Volt Ohm meter
Wire Crimper, Cutter, and Stripper

1.5 List of Supplies Required

Table 2 – Supplies Required

Carbon Paper 2- 8 ½ x 11 Sheets	Masking Tape
Double Sided Tape	Primer (per Mil-P-23377D)
FAA Advisory Circular 43.13	Solder: Rosin Core
Felt Marker: Ultra Fine Point	

1.6 List of Abbreviations

This section is to provide the reader with a complete state of the abbreviations used in this document and installation.

Table 3 – List of Abbreviations

A/R	As Required
AC	Advisory Circular
AMM	Airplane Maintenance Manual
BL	Butt Line
CB	Circuit Breaker
DC	Direct Current
FAA	Federal Aviation Administration
FS	Fuselage Station (Flight Station)
In	Inch
IR	Initial Release
Lb, lbs	Pounds
PFI	Precise Flight, Inc.
N/A or '-'	Not Applicable
V	Volts
VDC	Volts Direct Current
WL	Water Line
WS	Wing Station

1.7 Manual and ICA Revisions

To ensure the maintenance of our existing aircraft fleet, possible revisions to this manual, and especially section 4.0 Instructions for Continued Airworthiness may require updating over the life of the aircraft. Per the applicable Federal Aviation Regulations, an update process is required to properly maintain these instructions, in addition to the aircraft itself. Because of this, it is imperative to complete the registration card for the aircraft once the system is installed.

Revisions can be made by a service letter from Precise Flight, an Airworthiness Directive as issued by the administrator, by single page updates, or a complete replacement of all pages of the manual. It must be clearly noted as to the revision level of the pages listed in The List of Active Pages. If a single sheet(s) is replaced, replace the list of active pages with the new one provided, or update the list manually and initial and date the list.

2.0 INSTALLATION INSTRUCTIONS

Read all installation instructions prior to starting the installation, or modifying the aircraft. If necessary, please contact Precise Flight Incorporated at (541) 382-8684 and ask for SpeedBrake assistance, or write us at the address above, if you have any questions.

For the installation, use the appropriate drawings as defined by PFI drawing 121S0001 that lists the model and the aircraft voltage. If the aircraft/voltage combination is not listed, notify PFI prior to starting installation, as the combination requires further FAA certification. The Model combinations are as follows:

Applicable Bonanza/Debonair Models Model	Aircraft Voltage	PFI Drawing/Configuration Number	PFI Kit Number
35-33, 35-A33, 35-B33, 35-C33, 35-C33A, E33, E33A, E33C, F33, F33A, F33C, G33	12V	121S0001-5	4006-12
35-33, 35-A33, 35-B33, 35-C33, 35-C33A, E33, E33A, E33C, F33, F33A, F33C, G33	24V	121S0001-3	4006-24
A35, B35, C35, D35, E35, F35, G35, 35R, H35, J35, K35, N35, P35, S35, V35, V35A, V35B	12V	121S0001-4	4002-12
A35, B35, C35, D35, E35, F35, G35, 35R, H35, J35, K35, N35, P35, S35, V35, V35A, V35B	24V	121S0001-2	4002-24
36, A36, A36TC	12V	121S0001-6	4005-12
36, A36, A36TC	24V	121S0001-1	4005-24

! **CAUTION** !
Verify aircraft voltage and SpeedBrake kit voltage prior to installation. Failure to use correct installation kit may damage aircraft systems, or SpeedBrake system.

2.1 INTERIOR REMOVAL

TOOLS / MATERIALS REQUIRED		
Screwdriver #1 and #2	¼" Drive Socket Set	Approved Maintenance/Service Manual for the Aircraft.

1. Make sure that there is no previously installed equipment in the cartridge unit location that could interfere with the SpeedBrake™ installation. IE: additional fuel tanks.
2. Remove all of the seats and the carpet from the main spar per aircraft maintenance/service manual.
3. Remove the plastic shroud over the central seat rail location and the left and right outboard seat rails per aircraft maintenance/service manual.
4. Remove the kick panel on the left side behind the aft spar per aircraft maintenance/service manual.
5. Remove the interior side panels per aircraft maintenance/service manual.

2.2 INSTALLATION OF THE ASYMMETRIC LOGIC CONTROLLER (ALC)

TOOLS / MATERIALS REQUIRED		
Copy of AC 43.13-1B Chp. 11	Drill motor	Drills: #12
Screw driver: #2 Phillips	3M Adhesive or Equivalent	Felt Marker

PARTS REQUIRED			
Part Number	**Qty**	**Description**	**PFI Code Number**
121S0001	1	DRAWING: Beech Bonanza SpeedBrake 2000 System Installation	-
121S0004	1	DRAWING: Beech Bonanza SpeedBrake 2000 System Schematic	-
121S0014	1	DRAWING: Beech Bonanza SpeedBrake 2000 ALC Interconnect Installation	-
010S0043-1	1	SpeedBrake 2000 ALC	05191
MS24694S5	4	FHD 8-32 Screws	01477
AN960-8L	4	#8 Washer (or NAS Equivalent)	00452
AN365-832A	4	Nut, RD HT 8-32	00485
RT-675-NA	5	Ty-Wrap	00370

1. Reference Drawing 121S0014. Place the ALC (Code Number 05191) in place. Mark holes with felt marker and dimple with automatic center punch.
2. Drill 4 holes using a #12 drill, and deburr.
3. Install the ALC as shown using the four 8-32 screws, #8 washers, and 8-32 nuts per drawing 121S0014.
4. Check to ensure that ALC unit and cable assembly installation does not interfere with any other aircraft system. Take specific care in verification that the system does not interfere with the control system. Use Ty-Wraps to secure the wiring using guidance from the correct chapter of AC 43.13

NOTE
The SpeedBrake™ 2000 ALC is voltage sensing between 12-14VDC and 24-28VDC systems only.

2.3 ELECTRICAL INSTALLATION

TOOLS / MATERIALS REQUIRED		
Soldering iron	Solder: rosin core	Wire crimper, cutter, and stripper
Drill motor	Drills: 7/16, 5/8 capacity Unibit	Copy of AC 43.13-1A Chapter 11

PARTS REQUIRED			
Part Number	**Qty**	**Description**	**PFI Code Number**
121S0001	1	DRAWING: Beech Bonanza SpeedBrake 2000 System Installation	-
121S0002	1	DRAWING: Beech Bonanza SpeedBrake 2000 Cockpit Control Installation	-
121S0004	1	DRAWING: Beech Bonanza SpeedBrake 2000 System Schematic	-
121S0014	1	DRAWING: Beech Bonanza SpeedBrake 2000 ALC Interconnect Installation	-

1. Route and secure the wire harnesses as shown on the appropriate Drawing 121S0001 and guidance provided in AC43.13-1 for securing the wire to aircraft structure. See Drawing 121S0002 for Cockpit switch and circuit breaker locations.

!! WARNING !!
Ensure the installation of the wiring will not interfere with flight controls, or other systems in the aircraft. Attach wiring to structure as required per AC43.13 to prevent interference, or chafing.

2. Terminate wire harness at ALC and in each wing at the SpeedBrake location. Reference Drawings 121S0001 and 121S0004.

2.4 LOCATING WING CUTOUTS

Because the installation of the SpeedBrakes requires locations for the model 33 & 36 'straight tail' to be different from the model 35 'V-tail' bonanzas based on flight-testing, special care must be taken to ensure the correct location is used. The basic installation procedures are the same between the two locations.

> ! **CAUTION** !
> Due to the wing structure, the model 35 doubler installations, and the model 33 & 36 doubler installations are different.
>
> Do **not** continue with installation if your parts do not match the applicable drawings for the installation and Model of Aircraft.

The template, and parts are listed in the respective sub-sections for the two (2) installation types. The tools required are the same for both installations.

TOOLS / MATERIALS REQUIRED		
Automatic center punch	Masking tape	Tape measure
Carbon paper	-	-

> ! **CAUTION** !
> At this time, re-verify before cutting and drilling into the wing that there are no other installations that will interfere with the installation of this STC in the location where the SpeedBrakes are being installed. If others modifications, or options are installed and will interfere with this installation, contact Precise Flight prior to cutting into the wing.

> **NOTE**
> All cuts in the wing are final and reflect the final installation. Accuracy with the templates is required for correct operation, and the final cosmetic appearance of the installation.

> **NOTE**
> It is always helpful to us the doubler parts to verify that the templates, holes, and cutouts align correctly before drilling or cutting into the wing.

2.4.1 Model 33 and 36 (Straight Tail) Installation Instructions

This section is for the locating of the wing cutouts for the 'Straight Tail' Beech Bonanza Models 33 and 36.

PARTS REQUIRED			
Part Number	**Qty**	**Description**	**PFI Code Number**
121S0001	1	DRAWING: Beech Bonanza SpeedBrake 2000 System Installation	-
121S0103	1	DRAWING: Beech Bonanza SpeedBrake 2000 Cartridge Installation	-
121S0105	1	DRAWING: Beech Bonanza SpeedBrake 2000 Upper Doubler Installation Template – **Left** (Sheet 1 of 2)	-
121S0105	1	DRAWING: Beech Bonanza SpeedBrake 2000 Upper Doubler Installation Template – **Right** (Sheet 2 of 2)	-
121S0106	1	DRAWING: Beech Bonanza SpeedBrake 2000 Lower Doubler Installation Template – **Left** (Sheet 1 or 2)	-
121S0106	1	DRAWING: Beech Bonanza SpeedBrake 2000 Lower Doubler Installation Template – **Right** (Sheet 2 or 2)	-

Upper Wing Cutouts:

1. On top of the left wing, locate the area where the SpeedBrake™ cartridges are to be installed.
2. Place Template Drawing 121S0105 Sheet 1 on the left wing and align using the existing rivet rows and wing skin lap. Once properly aligned, secure the template with masking tape.
3. Place carbon paper under the template. Transfer the cut out lines, cutout corner reference holes, new rivet locations, and the existing rivets to be removed. Remove the template and set aside.
4. Repeat steps 1 through 4 on the right upper wing using Template Drawing 121S0105 Sheet 2.

Lower Wing Cutouts:

5. On bottom of the left wing, locate the area where the SpeedBrake™ cartridges are to be installed.
6. Place Template Drawing 121S0106 Sheet 1 on the left wing and align using the existing rivet rows and wing skin lap. Once properly aligned, secure the template with masking tape.
7. Place carbon paper under the template. Transfer the cut out lines, cutout corner reference holes, new rivet locations, and the existing rivets to be removed. Remove the template and set aside.
8. Repeat steps 5 through 7 on the right lower wing using Template Drawing 121S0106 Sheet 2.

2.4.2 Model 35 (V-Tail) Installation Instructions

This section is for the locating of the wing cutouts for the 'V-tail' Beech Bonanza Model 35's.

PARTS REQUIRED			
Part Number	**Qty**	**Description**	**PFI Code Number**
121S0001	1	DRAWING: Beech Bonanza SpeedBrake 2000 System Installation	-
121S0003	1	DRAWING: Beech Bonanza SpeedBrake 2000 Cartridge Installation	-
121S0005	1	DRAWING: Beech Bonanza SpeedBrake 2000 Upper Doubler Installation Template – **Left** (Sheet 1 of 2)	-
121S0005	1	DRAWING: Beech Bonanza SpeedBrake 2000 Upper Doubler Installation Template – **Right** (Sheet 2 of 2)	-
121S0006	1	DRAWING: Beech Bonanza SpeedBrake 2000 Lower Doubler Installation Template – **Left** (Sheet 1 or 2)	-
121S0006	1	DRAWING: Beech Bonanza SpeedBrake 2000 Lower Doubler Installation Template – **Right** (Sheet 2 or 2)	-

Upper Wing Cutouts:

1. On top of the left wing, locate the area where the SpeedBrake™ cartridges are to be installed.
2. Place Template Drawing 121S0005 Sheet 1 on the left wing and align using the existing rivet rows and wing skin lap. Once properly aligned, secure the template with masking tape.
3. Place carbon paper under the template. Transfer the cut out lines, cutout corner reference holes, new rivet locations, and the existing rivets to be removed. Remove the template and set aside.
4. Repeat steps 1 through 4 on the right upper wing using Template Drawing 121S0005 Sheet 2.

Lower Wing Cutouts:

5. On bottom of the left wing, locate the area where the SpeedBrake™ cartridges are to be installed.
6. Place Template Drawing 121S0006 Sheet 1 on the left wing and align using the existing rivet rows and wing skin lap. Once properly aligned, secure the template with masking tape.
7. Place carbon paper under the template. Transfer the cut out lines, cutout corner reference holes, new rivet locations, and the existing rivets to be removed. Remove the template and set aside.
8. Repeat steps 5 through 7 on the right lower wing using Template Drawing 121S0006 Sheet 2.

2.5 RIVET REMOVAL AND WING CUTOUTS

TOOLS / MATERIALS REQUIRED		
Chip chaser	Drill motor	Drills: #40, #30, #27, ¼"
Files: ¼" round and 6" flat	Snips 20SR, 20SL (optional)	Die grinder with abrasive cutter

2.5.1 Model 33 & 36 (Straight tail) Rivet Removal and Wing Cutouts

PARTS REQUIRED			
Part Number	**Qty**	**Description**	**PFI Code Number**
121S0001	1	DRAWING: Beech Bonanza SpeedBrake 2000 System Installation	-
121S0003	1	DRAWING: Beech Bonanza SpeedBrake 2000 Cartridge Installation	-
121S0105	1	DRAWING: Beech Bonanza SpeedBrake 2000 - Upper Doubler Installation Template Model 33 & 36 – **Left** (Sheet 1 of 2)	-
121S0105	1	DRAWING: Beech Bonanza SpeedBrake 2000 - Upper Doubler Installation Template Model 33 & 36 – **Right** (Sheet 2 of 2)	-
121S0106	1	DRAWING: Beech Bonanza SpeedBrake 2000 - Lower Doubler Installation Template Model 33 & 36 - **Left** (Sheet 1 of 2)	-
121S0106	1	DRAWING: Beech Bonanza SpeedBrake 2000 -Lower Doubler Installation Template Model 33 & 36 – **Right** (Sheet 2 of 2)	-

Various standard methods may be employed to make the cutouts in the wings.

NOTE
The bottom doubler cutout must be started, or cutout, to allow access to install the upper doubler.

Left Wing

1. Drill out all the existing rivets to be removed as indicated on the Template Drawing 121S0105 Sheet 1.
2. Center punch and drill new rivet locations (#40) as indicated on template.
3. Center punch and drill out corner reference holes to ¼".
4. Using the die grinder and abrasive cutter or snips, staying within the traced lines, open the wing cutouts.
5. Finish the openings by filing to the traced lines using a combination of the ¼" round and 6" flat files.

6. Remove all bucked ends and any chips remaining inside the wing.
7. Repeat steps 1 through 4 on the right wing. (Reference Template Drawing 121S0105 Sheet 2)
8. Drill out all the existing rivets to be removed as indicated on the Template Drawing 121S0106 Sheet 1.
9. Center punch and drill new rivet locations (#40) as indicated on template.
10. Center punch and drill out corner reference holes to ¼".
11. Using the die grinder and abrasive cutter or snips, staying within the traced lines, open the wing cutouts.
12. Finish the openings by filing to the traced lines using a combination of the ¼" round and 6" flat files.
13. Remove all bucked ends and any chips remaining inside the wing.
14. Repeat steps 1 through 14 on the right wing. (Reference Template Drawing 121S0106 Sheet 2)

NOTE:
Care must be taken when finishing the wing cutouts to prevent stress concentrations and the cutouts will be visible when completed.

2.5.2 Model 35 (V-tail) Rivet Removal and Wing Cutouts

PARTS REQUIRED			
Part Number	**Qty**	**Description**	**PFI Code Number**
121S0005	1	DRAWING: Beech Bonanza SpeedBrake 2000 - Upper Doubler Installation Template Model 35 – **Left** (Sheet 1 of 2)	-
121S0005	1	DRAWING: Beech Bonanza SpeedBrake 2000 - Upper Doubler Installation Template Model 35 – **Right** (Sheet 2 of 2)	-
121S0006	1	DRAWING: Beech Bonanza SpeedBrake 2000 - Lower Doubler Installation Template Model 35 – **Left** (Sheet 1 of 2)	-
121S0006	1	DRAWING: Beech Bonanza SpeedBrake 2000 -Lower Doubler Installation Template Model 35 – **Right** (Sheet 2 of 2)	-

Various standard methods may be employed to make the cutouts in the wings.

NOTE
The bottom doubler cutout must be started, or cutout, to allow access to install the upper doubler.

Left Wing

1. Drill out all the existing rivets to be removed as indicated on the Template Drawing 121S0005 Sheet 1.
2. Center punch and drill new rivet locations (#40) as indicated on template.
3. Center punch and drill out corner reference holes to ¼".
4. Using the die grinder and abrasive cutter or snips, staying within the traced lines, open the wing cutouts.
5. Finish the openings by filing to the traced lines using a combination of the ¼" round and 6" flat files.
6. Remove all bucked ends and any chips remaining inside the wing.
7. Repeat steps 1 through 4 on the right wing. (Reference Template Drawing 121S0005 Sheet 2)
8. Drill out all the existing rivets to be removed as indicated on the Template Drawing 121S0006 Sheet 1.
9. Center punch and drill new rivet locations (#40) as indicated on template.
10. Center punch and drill out corner reference holes to ¼".

11. Using the die grinder and abrasive cutter or snips, staying within the traced lines, open the wing cutouts.
12. Finish the openings by filing to the traced lines using a combination of the ¼" round and 6" flat files.
13. Remove all bucked ends and any chips remaining inside the wing.
14. Repeat steps 1 through 14 on the right wing. (Reference Template Drawing 121S0006 Sheet 2)

NOTE:
Care must be taken when finishing the wing cutouts to prevent stress concentrations and the cutouts will be visible when completed.

2.6 DOUBLER PREPARATION

TOOLS REQUIRED		
Drill motor	Drills #30, #40, #27	Primer
Cleco pliers	Cleco: #3, #4	Hole-Finder

2.6.1 Model 33 & 36 (Straight tail) Doubler Preparation

PARTS REQUIRED			
Part Number	**Qty**	**Description**	**PFI Code Number**
121S0105	1	DRAWING: Beech Bonanza SpeedBrake 2000 - Upper Doubler Installation Template Model 33 & 36 - **Left** (Sheet 1 of 2)	-
121S0105	1	DRAWING: Beech Bonanza SpeedBrake 2000 - Upper Doubler Installation Template Model 33 & 36 – **Right** (Sheet 2 of 2)	-
121S0106	1	DRAWING: Beech Bonanza SpeedBrake 2000 - Lower Doubler Installation Template Model 33 & 36 – **Left** (Sheet 1 of 2)	-
121S0106	1	DRAWING: Beech Bonanza SpeedBrake 2000 -Lower Doubler Installation Template Model 33 & 36 – **Right** (Sheet 2 of 2)	-
121S0109-1	2	Upper Doubler	04767
121S0110-1	1	Lower Doubler - **LEFT**	05308
121S0110-2	1	Lower Doubler - **RIGHT**	05307
121S0111-1	2	Access Cover	04732

NOTE:
Because the upper doublers (121S0109-1) are the same part, but not symmetric for the left and right wings, verify the orientation of the doubler to the templates, and mark as necessary to prevent miss-installation.

Left Wing

1. Insert the upper doubler into the left wing through the cutouts.
2. The doublers will be installed under the wing skin and on top of the stringers.
3. Orient the doublers with the cutout in the skin.
4. Drill rivet holes the appropriate sizes as indicated on the Drawing 121S0105 Sheet 1. Cleco Doublers in place as you go.
5. Dimple holes in wing skin and doubler as indicated on Drawing 121S0105 Sheet 1
6. Repeat steps 1 through 4 on the right wing. Template Drawing 121S0105 Sheet 2.

7. Remove doublers and indicate their positions. Chip chase and remove chips from in the wing.
8. Deburr and prime doublers.
9. Insert the lower doubler into the left wing through the cutouts.
10. The doublers will be installed under the wing skin between the stringers.
11. Orient the doublers with the cutout in the skin.
12. Drill rivet holes the appropriate sizes as indicated on the Drawing 121S0106 Sheet 1. Cleco Doublers in place as you go.
13. Dimple holes in wing skin and doubler as indicated on Drawing 121S0106 Sheet 1
14. Repeat steps 1 through 4 on the right wing. Template Drawing 121S0106 Sheet 2.
15. Remove doublers and indicate their positions. Chip chase and remove chips from in the wing.
16. Deburr and prime doublers.

2.6.2 Model 35 (V-tail) Doubler Preparation

PARTS REQUIRED			
Part Number	**Qty**	**Description**	**PFI Code Number**
121S0005	1	DRAWING: Beech Bonanza SpeedBrake 2000 - Upper Doubler Installation Template Model 35 – **Left** (Sheet 1 of 2)	-
121S0005	1	DRAWING: Beech Bonanza SpeedBrake 2000 - Upper Doubler Installation Template Model 35 – **Right** (Sheet 2 of 2)	-
121S0006	1	DRAWING: Beech Bonanza SpeedBrake 2000 - Lower Doubler Installation Template Model 35 – **Left** (Sheet 1 of 2)	-
121S0006	1	DRAWING: Beech Bonanza SpeedBrake 2000 -Lower Doubler Installation Template Model 35 – **Right** (Sheet 2 of 2)	-
121S0009-1	2	Upper Doubler (Note the same doublers used on Left and Right Wings)	04730
121S0010-1	2	Lower Doubler (Note the same doublers used on Left and Right Wings)	04731
121S0111-1	2	Access Cover	04732

Left Wing

1. Insert the upper doubler into the left wing through the cutouts.
2. The doublers will be installed under the wing skin and on top of the stringers.
3. Orient the doublers with the cutout in the skin.
4. Drill rivet holes the appropriate sizes as indicated on the Drawing 121S0005 Sheet 1. Cleco Doublers in place as you go. Locate stringer holes with a Hole finder.
5. Dimple holes in wing skin and doubler as indicated on Drawing 121S0005 Sheet 1
6. Repeat steps 1 through 4 on the right wing. Template Drawing 121S0005 Sheet 2.
7. Remove doublers and indicate their positions. Chip chase and remove chips from in the wing.
8. Deburr and prime doublers.
9. Insert the lower doubler into the left wing through the cutouts.
10. The doublers will be installed under the wing skin between the stringers.
11. Orient the doublers with the cutout in the skin.

12. Drill rivet holes the appropriate sizes as indicated on the Drawing 121S0006 Sheet 1. Cleco Doublers in place as you go.
13. Dimple holes in wing skin and doubler as indicated on Drawing 121S0006 Sheet 1
14. Repeat steps 1 through 4 on the right wing. Template Drawing 121S0006 Sheet 2.
15. Remove doublers and indicate their positions. Chip chase and remove chips from in the wing.
16. Deburr and prime doublers.

2.7 DOUBLER INSTALLATION

TOOLS REQUIRED		
Cleco pliers	Cleco: 3/32, 1/8	C Squeeze: Dimple Dies #40
Rivet gun: 3/32,1/8 and flush set	Flush Dies	Rivet puller
Bucking Bars	Two People	-

2.7.1 Model 33 & 36 (Straight tail) Doubler Installation

PARTS REQUIRED			
Part Number	**Qty**	**Description**	**PFI Code Number**
121S0105	1	DRAWING: Beech Bonanza SpeedBrake 2000 - Upper Doubler Installation Template Model 35 – **Left** (Sheet 1 of 2)	-
121S0105	1	DRAWING: Beech Bonanza SpeedBrake 2000 - Upper Doubler Installation Template Model 35 – **Right** (Sheet 2 of 2)	-
121S0106	1	DRAWING: Beech Bonanza SpeedBrake 2000 - Lower Doubler Installation Template Model 35 – **Left** (Sheet 1 of 2)	-
121S0106	1	DRAWING: Beech Bonanza SpeedBrake 2000 -Lower Doubler Installation Template Model 35 – **Right** Drawing (Sheet 2 of 2)	-
121S0109-1	2	Upper Doubler	04767
121S0110-1	1	Lower Doubler - **LEFT**	05308
121S0110-2	1	Lower Doubler - **RIGHT**	05307
121S0111-1	2	Access Cover	04732
MS20426AD3-3	164	Rivet, Flat Head, 0.094 x 0.1875 Long	00486
MS20426AD3-4	76	Rivet, Flat Head, 0.094 x 0.25 Long	-

NOTE:
This step will require two people for riveting.

Left Wing

1. Insert the upper Doubler into the cutout in the wing.
2. Position the doublers in-between the wing skin and stringers. Orient the doublers into position by aligning it with the previously drill holes. Cleco in place.
3. Apply Pro Seal to Speedbrake™ opening as shown on Drawing 121S0105 Sheet 1
4. Rivet the doublers in place using the appropriate rivets. Reference Drawing 121S0105 Sheet 1.
5. Repeat Steps 1 through 3 on the right wing. Reference Drawing 121S0105 Sheet 2.

6. Insert the lower Doubler into the cutout in the wing.
7. Position the doublers inside between the stringers. Orient the doublers into position by aligning it with the previously drill holes. Cleco in place.
8. Rivet the doublers in place using the appropriate rivets. Reference Drawing 121S0105 Sheet 2.
9. Repeat Steps 1 through 3 on the right wing. Reference Drawing 121S0105 Sheet 2.

NOTE:
If Required, the use of oversized rivets is acceptable if work performed per FAA AC43.13, or an FAA approved aircraft structural repair manual

2.7.2 Model 35 (V-Tail) Doubler Installation

PARTS REQUIRED			
Part Number	**Qty**	**Description**	**PFI Code Number**
121S0005	1	DRAWING: Beech Bonanza SpeedBrake 2000 - Upper Doubler Installation Template Model 33 & 36 – **Left** (Sheet 1 of 2)	-
121S0005	1	DRAWING: Beech Bonanza SpeedBrake 2000 - Upper Doubler Installation Template Model 33 & 36 – **Right** (Sheet 2 of 2)	-
121S0006	1	DRAWING: Beech Bonanza SpeedBrake 2000 - Lower Doubler Installation Template Model 33 & 36 – **Left** (Sheet 1 of 2)	-
121S0006	1	DRAWING: Beech Bonanza SpeedBrake 2000 -Lower Doubler Installation Template Model 33 & 36 – **Right** (Sheet 2 of 2)	-
121S0009-1	2	Upper Doubler	04730
121S0010-1	2	Lower Doubler	04731
121S0111-1	2	Access Cover	04732
MS20426AD3-3	84	Rivet, Flat Head, 0.094 x 0.1875 Long	00486
MS20426AD3-4	28	Rivet, Flat Head, 0.094 x 0.25 Long	-

NOTE:
This step will require two people for riveting.

Left Wing

1. Insert the upper Doubler into the cutout in the wing.
2. Position the doublers in-between the wing skin and stringers. Orient the doublers into position by aligning it with the previously drill holes. Cleco in place.
3. Apply Pro Seal to Speedbrake™ opening as shown on Drawing 121S0005 Sheet 1
4. Rivet the doublers in place using the appropriate rivets. Reference Drawing 121S0005 Sheet 1.
5. Repeat Steps 1 through 3 on the right wing. Reference Drawing 121S0005 Sheet 2.
6. Insert the lower Doubler into the cutout in the wing.
7. Position the doublers inside between the stringers. Orient the doublers into position by aligning it with the previously drill holes. Cleco in place.
8. Rivet the doublers in place using the appropriate rivets. Reference Drawing 121S0005 Sheet 2.
9. Repeat Steps 1 through 3 on the right wing. Reference Drawing 121S0005 Sheet 2.

NOTE:
If Required, the use of oversized rivets is acceptable if work performed per FAA AC43.13. or an FAA approved aircraft structural repair manual

2.8 PRELIMINARY SPEEDBRAKE INSTALLATION

TOOLS REQUIRED		
Socket set ¼" drive	#8 Nut plate jig (AT518H)	Screw driver: #2 Phillips
Drill motor	Drill motor 90 degree	Drills: #18, #30, #40
C squeeze: Flush die set, #40 countersink die.	Center punch	Double sided tape

2.8.1 Model 33 & 36 (Straight tail) Preliminary SpeedBrake Installation

PARTS REQUIRED			
Part Number	**Qty**	**Description**	**PFI Code Number**
121S0103	1	DRAWING: Beech Bonanza SpeedBrake 2000 – Cartridge Install Model 33 & 36 (Sheets 1 thru 3)	-
010S0060-1	1*	SpeedBrake 2000 Cartridge – **Right Hand** – **12V**	05097R
010S0060-2	1*	SpeedBrake 2000 Cartridge – **Left Hand** – **12V**	05097L
010S0060-3	1*	SpeedBrake 2000 Cartridge – **Right Hand** – **24V**	05114R
010S0060-4	1*	SpeedBrake 2000 Cartridge – **Left Hand** – **24V**	05114L
121S0011-1	4	Attachment Angle	04733
121S0111-1	2	Access Cover	04732
121S0113-1	2	Inboard Bracket – Model 33 & 36	04768
121S0113-2	2	Outboard Bracket – Model 33 & 36	04769
573S0013-1	4	Attachment Hinge	04644
573S0013-2	4	Cartridge Hinge	04645
AN525-8R6	24	Screw, Washer Head, #8	00436
AN960-8L	16	Washer	00452
MS24693-C2	18	Screw, Flathead, #4, Stainless Steel	07025
MS24693-550	24	Screw, Flathead, #8-13	07001
MS20470AD4-5	16	Rivet	00528
MS20365-832A	16	Nut, 8-32	00485
2810	2	Snap Bushing	06062
90174A114	4	Safety Pin	06024

* Only one set of 12V or 24V SpeedBrake Cartridges is supplied per kit.

! **CAUTION** !
Verify aircraft voltage and SpeedBrake kit voltage prior to installation. Failure to use correct installation kit may damage aircraft systems, or SpeedBrake installation.

NOTE
010S0060-1 and 010S0060-2 are for the 12V installations, and 010S0060-3 and 010S0060-4 are for the 24V installations.

Left Wing

1. Install brackets and hinges to the Speedbrake™ Cartridge as shown in Drawing 121S0103.
2. Install Speedbrake™ Cartridge in the wing using the 4-40 screws to the upper wing skin.
3. Orient brackets as shown in Drawing 121S0103 and utilize double sided tape to position brackets within the aircraft wing insuring alignment with the hinge section. Use Hinge Pin to insure alignment.
4. Mark position of drain tube on lower Access Cover 121S0111-1.
5. Drill and install Snap Bushing as shown on Drawing 121S0103 in Access Panel.
6. Remove Speedbrake Cartridge and leave brackets in position.
7. Pilot drill hole locations in the Brackets.
8. Remove Brackets and drill for required fasteners. See Drawing 121S0103.

Right Wing

1. Repeat items 1-8 for the right wing.

2.8.2 Model 35 (V-tail) Preliminary SpeedBrake Installation

PARTS REQUIRED			
Part Number	**Qty**	**Description**	**PFI Code Number**
121S0003	1	DRAWING: Beech Bonanza SpeedBrake 2000 – Cartridge Install Model 35 (Sheet 1)	-
010S0060-1	1*	SpeedBrake 2000 Cartridge – **Right Hand** – **12V**	05097R
010S0060-2	1*	SpeedBrake 2000 Cartridge – **Left Hand** – **12V**	05097L
010S0060-3	1*	SpeedBrake 2000 Cartridge – **Right Hand** – **24V**	05114R
010S0060-4	1*	SpeedBrake 2000 Cartridge – **Left Hand** – **24V**	05114L
121S0011-1	4	Attachment Angle	04733
121S0011-2	2	Inboard Bracket – Model 35	04735
121S0011-3	2	Outboard Bracket – Model 35	04734
121S0111-1	2	Access Cover	04732
573S0013-1	4	Attachment Hinge	04644
573S0013-2	4	Cartridge Hinge	04645
AN525-8R6	24	Screw, Washer Head, #8	00436
AN960-8L	16	Washer	00452
MS24693-C2	18	Screw, Flathead, #4, Stainless Steel	07025
MS24693-550	24	Screw, Flathead, #8-13	07001
MS20470AD4-5	8	Rivet	00528
MS20365-832A	16	Nut, 8-32	00485
2810	2	Snap Bushing	06062
90174A114	4	Safety Pin	06024

* Only one set of 12V or 24V SpeedBrake Cartridges is supplied per kit.

! **CAUTION** !
Verify aircraft voltage and SpeedBrake kit voltage prior to installation. Failure to use correct installation kit may damage aircraft systems, or SpeedBrake installation.

NOTE
010S0060-1 and 010S0060-2 are for the 12V installations, and 010S0060-3 and 010S0060-4 are for the 24V installations.

Left Wing

1. Install brackets and hinges to the Speedbrake™ Cartridge as shown in Drawing 121S0003.
2. Install Speedbrake™ Cartridge in the wing using the 4-40 screws to the upper wing skin.

3. Orient brackets as shown in Drawing 121S0003 and utilize double sided tape to position brackets within the aircraft wing insuring alignment with the hinge section. Use Hinge Pin to insure alignment.
4. Mark position of drain tube on lower Access Cover 121S0111-1.
5. Drill and install Snap Bushing as shown on Drawing 121S0003.
6. Remove Speedbrake Cartridge and leave brackets in position.
7. Pilot drill hole locations in the Brackets.
8. Remove Brackets and drill for required fasteners. See Drawing 121S0003.

Right Wing

1. Repeat items 1-8 for the right wing.

2.9 FINAL CARTRIDGE INSTALLATION

TOOLS REQUIRED		
Screwdriver Philips #1 and #2	-	-

2.9.1 Model 33 & 36 (Straight tail) Cartridge Installation

PARTS REQUIRED			
Part Number	**Qty**	**Description**	**PFI Code Number**
121S0103	1	DRAWING: Beech Bonanza SpeedBrake 2000 – Cartridge Install Models 33 & 36 (Sheets 1 thru 3)	-
121S0004	1	DRAWING: Beech Bonanza SpeedBrake 2000 – Aircraft Schematic (Sheet 1)	-
Parts from Section 2.8			

Left Wing

1. Install Speedbrake™ Cartridge in the wing using the 4-40 screws to the upper wing skin.
2. Install brackets as shown in Drawing 121S0103.
3. Install hinge pins to both brackets as shown in Drawing 121S0103.
4. Insure that drain tube fits thru the grommet in the Access Panel.
5. Secure electrical connectors to the SpeedBrake™ Cartridge. Insure Wire Harness is well supported in the wing using guidance from the appropriate chapter of AC 43.13.

!! WARNING !!
Ensure the installation of the wiring will not interfere with flight controls, or other systems in the aircraft. Attach wiring to structure as required per AC43.13 to prevent interference, or chafing.

6. Install Access Panel.
7. Trim drain tube 1/4 inch from wing skin at an angle away from the direction of airflow.

NOTE:
An angle of 45° aft works the best to provide the best suction due to the airflow beneath the wing.

Right Wing

1. Repeat items 1-7 for the right wing.

2.9.2 Model 35 (V- tail) Cartridge Installation

PARTS REQUIRED			
Part Number	**Qty**	**Description**	**PFI Code Number**
121S0003	1	DRAWING: Beech Bonanza SpeedBrake 2000 – Cartridge Install Models 35 (Sheets 1thru 3)	-
121S0004	1	DRAWING: Beech Bonanza SpeedBrake 2000 – Aircraft Schematic (Sheet 1)	-
Parts from Section 2.8			

Left Wing

1. Install Speedbrake™ Cartridge in the wing using the 4-40 screws to the upper wing skin.
2. Install brackets as shown in Drawing 121S0103.
3. Install hinge pins to both brackets as shown in Drawing 121S0103.
4. Insure that drain tube fits thru the grommet in the Access Panel.
5. Secure electrical connectors to the SpeedBrake™ Cartridge. Insure Wire Harness is well supported in the wing using guidance from the appropriate chapter of AC 43.13.

!! WARNING !!
Ensure the installation of the wiring will not interfere with flight controls, or other systems in the aircraft. Attach wiring to structure as required per AC43.13 to prevent interference, or chafing.

6. Install Access Panel.
7. Trim drain tube 1/4 inch from wing skin at an angle away from the direction of airflow.

NOTE:
An angle of 45° aft works the best to provide the best suction due to the airflow beneath the wing.

Right Wing

1. Repeat items 1-7 for the right wing.

2.10 CIRCUIT BREAKER AND SWITCH INSTALLATION

TOOLS REQUIRED		
AC 43.13	Drill motor	Drills: 7/16, 5/8 capacity Unibit
Soldering iron	Solder: rosin core	Needle nose pliers
Wire crimper, cutter, & stripper	-	-

PARTS REQUIRED			
Part Number	**Qty**	**Description**	**PFI Code Number**
121S0002	1	DRAWING: Beech Bonanza SpeedBrake 2000 – Cockpit Control Installation (Sheet 1)	-
121S0004	1	DRAWING: Beech Bonanza SpeedBrake 2000 – Aircraft Schematic (Sheet 1)	-
41-463.036	1	Switch	02347
41-907.6/6	1	Lens	02307
GE336	2	**12V System Only** – Light	01187
GE334	2	**24V System Only** – Light	00961
010S0201-1	1	Speedbrake Switch Placard	08403
7277-2-3	1	Circuit Breaker, 3Amp	01270

NOTE
For switch and light locations other than shown in Drawing 121S0002, obtain separate FAA engineering approval.

NOTE
121S0002-1 is for the 24V installation, and 121S0002-2 is for the 12V installation. Be sure to use the correct light bulb as the incorrect bulb may create excessive heat on the lighted switch.

1. Insure Wire Harness is well supported in the fuselage and route wires to C/B, Ground and Switch locations Reference Drawings number 121S0002.
2. At the instrument panel, install and wire the Circuit Breaker, Reference Drawing number 121S0004 for proper wiring harness color.
3. Insert the proper light bulbs into the switch or annunciator, depending on option ordered and aircraft voltage.
4. Install the switch within full view and easy access of the pilot. Use Drawing number 121S0002, and the appropriate chapter of AC 43.13 for reference.

NOTE:
For switch and light locations other than that shown, obtain separate FAA approval for the alternate installation.

2.11 PLACARDS INSTALLATION

TOOLS REQUIRED		
Cleaning Solution	Lint Free Rag	-

PARTS REQUIRED			
Part Number	**Qty**	**Description**	**PFI Code Number**
121S0002	1	DRAWING: Beech Bonanza SpeedBrake 2000 – Cockpit Control Installation	-
010S0002-2	2	Placard, SpeedBrake	00455

1. Install Placard (Part Number 010S0002-2) at SpeedBrake™ circuit breaker, and next to SpeedBrake™ switch per Drawing 121S0002.

SPEEDBRAKE **SPEEDBRAKE**

2.12 INTERIOR INSTALLATION

TOOLS / MATERIALS REQUIRED		
Screwdriver #1 and #2	¼" Drive Socket Set	Approved Maintenance/Service Manual for the Aircraft.

NOTE:
Re-Installation may be done at the end of the previous steps as deemed per the installer. Aircraft must be returned to a flight worthy condition prior to flight.

1. Re-install the interior side panels per aircraft maintenance/service manual.
2. Re-install the kick panel on the left side behind the aft spar per aircraft maintenance/service manual.
3. Re-Install the plastic shroud over the central seat rail location and the left and right outboard seat rails per aircraft maintenance/service manual.
4. Re-Install all of the seats and the carpet from the main spar per aircraft maintenance/service manual.

2.13 SYSTEM INSTALLATION FUNCTIONAL CHECK OUT

TOOLS / MATERIALS REQUIRED		
Screwdriver #1 and #2	¼" Drive Socket Set	Approved Maintenance/Service Manual for the Aircraft.

NOTE:
Read Section 3.0 Trouble Shooting Guide, and review installation per drawings if any errors are noticed.

!! WARNING !!
DO NOT OPERATE THE SPEEDBRAKES™ BY HAND
While electrical power is on. Personal injuries and damage to cartridges and may result!.

1. Verify the aircraft is at full voltage (above 12V for a 12V system), use APU as necessary.
2. Using the AFMS, perform a functional check of the system.

2.14 DOCUMENTATION

Before performing flight tests it is recommended you complete the calculations for weight and balance for 9 lbs at the appropriate FS for the specific aircraft model and revise the equipment list showing installation of Precise Flight SpeedBrakes™. FAA Form 337, section 8 "Description of Work Accomplished".

8. Description of Work Accomplished

(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)

A. The following components were installed:
PRECISE FLIGHT 2000 Series Electric SpeedBrake™ STC # SA01075SE.
Installation Kit Number _____.

B. Installed the SpeedBrake system in accordance with Precise Flight Installation report #8085 and guidance in FAA Advisory Circulars 43.13-1A, Chapter 11, and 43.13-2A, Chapter 1 & 2.

C. An electrical load analysis was performed and the revised continuous load of the alternator (*generator or other supply*) does not exceed 80% of capacity or approved in accordance with the procedures in FAA Advisory Circular 43.13-1A, Chapter 11, Section 426.

D. A complete operational test was performed according to SPEEDBRAKE Installation Manual #8085 date _____. The equipment performed satisfactorily and did not adversely affect existing components or systems in the aircraft, as required by FAR 23.1301, FAR 23.1431.

E. The aircraft equipment list was revised to reflect these changes; weight and balance data was revised and placed in the aircraft records. A Precise Flight Inc. SPEEDBRAKE Aircraft Flight Manual Supplement dated _____ was placed in the aircraft.

Figure 3 - Suggested FAA Form 337 Description of Work Statment

Add the FAA approved Flight Manual Supplement to the aircraft Flight manual.

Keep all Precise Flight 2000 Series Electric SpeedBrake™ papers with aircraft records.

Fill out and return warranty card to Precise Flight Inc.

3.0 TROUBLE SHOOTING GUIDE

3.1 SPEEDBRAKE CARTRIDGE FAILS TO OPERATE CORRECTLY

a. Check circuit breaker
b. Check cannon plugs for security
c. Check cannon plug (Code Number 01726) for correct wiring (See Drawing No. 121S0004 for electrical installation procedures.)
d. If Speedbrake doors open, check that doors stop approximately ¼" before being fully vertical. There should be no gap between the Speedbrake doors. If doors open beyond this position call Precise Flight, Inc.

3.2 WARNINGS

- **DO NOT OPERATE THE SPEEDBRAKES™ BY HAND**
  While electrical power is on. Damage to cartridges and personal injuries may result!

- **DO NOT USE SPRAY LUBRICANTS ON SPEEDBRAKES™**
  Damage to cartridges and Speedbrake clutch may result!

3.3 ADDITIONAL TECHNICAL ASSISTANCE

Please call Precise Flight, Inc. 800-547-2558

4.0 INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

4.1 INTRODUCTION

The contents of this section provides the instructions for continued airworthiness for the SpeedBrake® 2000 Series System Installation. Because a majority of the installation does not affect the standard airworthiness of the aircraft, only the key items that exist different are noted in this section. All structure and general maintenance must be performed in accordance with existing approved maintenance practices, or the aircraft maintenance manual.

4.2 SYSTEM DESCRIPTION

The Series 2000 SpeedBrake® Option consists of wing mounted electric SpeedBrake® Cartridges. Each SpeedBrake Cartridge is interconnected electronically by a central logic-switching unit and the yoke mounted SpeedBrake actuator switch. The SpeedBrake® Cartridges receive electrical power from the aircraft electrical buss through a disconnect type circuit breaker.

Precise Flight SpeedBrake® 2000 System is installed to provide expedited descents at low cruise power, glide path control on final approach, airspeed reduction and an aid to the prevention of excessive engine cooling in descent. The SpeedBrakes can be extended at aircraft speeds up to V_{ne}.

The SpeedBrake Annunciator switch is located near the airspeed indicator. The switch is depressed on position to fully deploy and is positioned off to retract the SpeedBrakes. The switch includes annunciation to indicate deployment if both SpeedBrake® units are deployed. A failure of a single cartridge drive unit will prevent the annunciator light from illuminating.

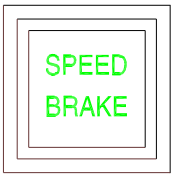

FIGURE 1-1 SPEEDBRAKE ANNUNCIATOR SWITCH

The Annunciator will light after the SpeedBrake® Switch is toggled ON and both brakes are in the up position. If the annunciator fails to light and both brakes do not extend after the switch is depressed, it indicates a failure of one SpeedBrake® cartridge and the SpeedBrake® switch should be depressed off. The system can be checked again for proper operation, but after the second attempt, the SpeedBrake® switch should be left off. When the SpeedBrake® Switch is depressed OFF, the annunciator will extinguish when both brakes are fully stowed in the wing.

4.3 SPECIAL TOOLS REQUIRED

Refer to Table 1 and Table 2 of this document for a list of special tools and materials required for installation and maintenance of the SpeedBrake® 2000 system.

4.4 MAINTENANCE INSTRUCTIONS

Maintain aircraft structure, and wiring in accordance with aircraft maintenance manual, and FAA AC 43.13. Access to the SpeedBrake installation is through the lower access panel installed per section 2 of this document.

4.5 TROUBLE SHOOTING GUIDE

Refer to Section 3 of this document for trouble shooting guide.

4.6 AIRWORTHINESS LIMITATIONS

None – The operation of the SpeedBrake® System does not impact the airworthiness limitations and is not required for normal flight.

4.7 SCHEDULED MAINTENANCE INTERVALS AND INSPECTIONS FOR CONTINUED AIRWORTHINESS

This section includes the inspection intervals, and requirements, for maintenance of the SpeedBrake® 2000 system when installed in the Aircraft. The breakdown of required inspections is listed in Table 4.

Table 4 - Scheduled Maintanance Intervals and Inspections

SPEEDBRAKE 2000 ™	EACH 50 HOURS	EACH 100 HOURS	ANNUALLY	EACH 1000 HOURS	EACH 5000 HOURS
1. Check Cap Strip Cover screws for security, if loose, remove screws and apply Loctite 242, re-torque to 8 in-lbs. Check SpeedBrake top attachment screws for security, if loose, remove screws and apply Loctite 242, re-torque to 8 in-lbs.	•				
2. Check drain tubes for debris	•				
3. a.) Remove inspection plates b.) Disconnect electrical plugs c.) Remove SpeedBrakes™ from aircraft d.) **Clean and Inspect unit for damage, corrosion, looseness & proper operation** e.) Lubricate **worm and worm gear with Lubriplate. DO NOT USE SPRAY LUBRICANTS!** f.) Reinstall SpeedBrakes™ in aircraft g.) Connect electrical plugs h.) Install inspection plate i.) Check for proper placards			•		
4. a.) Remove inspection plates b.) Disconnect electrical plugs c.) Remove SpeedBrakes™ from aircraft d.) Return SpeedBrakesTM to Precise Flight Inc. for **Clutch Lubrication and Spring Replacement** e.) Reinstall SpeedBrakes™ in aircraft f.) Connect electrical plugs g.) Install inspection plate				•	
5. a.) Remove inspection plates b.) Disconnect electrical plugs c.) Remove SpeedBrakesTM from aircraft d.) Return SpeedBrakes™ to Precise Flight Inc. for **Drive Assembly Replacement** e.) Reinstall SpeedBrakesTM in aircraft f.) Connect electrical plugs g.) Install inspection plate					•

5.0 APPENDICES